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May 23, 2000

TITLE: Automated contract negotiator/generation system and method

A contract system automates negotiation and generation of contract documents by managing the work flow in a contract approval process. Multiple users, coupled by a computer network, access a contract database containing multiple contracts with multiple contract components therein. The system manages communications and security between a client system and the contract database. A client applet facilitates user input at the client system and assists in a standardization of legal phrasing and contract negotiation. The client applet enforces business rules to qualify a contract for expedited approval. Generalized templates are employed to enable rapid prototyping and creation of new contracts. A method governs the automated contract negotiation and generation process within a business organization with assistance from a graphical user interface.

FIG. 16 illustrates a screen for entering a new contract into a system in accordance with the present invention.

Furthermore, a system in accordance with the present invention may interface to other corporate back-office applications. Database server 206 is coupled via a TCP/IP link to corporate back-office systems 212, commonly on mainframe MVS systems running back-office applications. Customized application procedural interfaces (APIs) are generally used to accomplish the back-office communication. One example of a back-office system is a billing order entry system. Such a system is an order entry system that is used to establish hierarchies within a customer's corporate structure and to store discount contract information. The system builds corporate customer billing hierarchies, and feeds these to billing systems for multiple-level invoicing. An interface to the billing order entry system may be used to automate further procedures. For example, once a contract has been finalized and approved (the status for which is maintained in the contract database), the system may issue a message to the back-office billing order entry system, thereby triggering installation or activation of the services for that customer. The back-office system can also send messages to the database server to update the contract database with contract status changes that result from services activated in the back-office system.

As depicted in FIGS. 4A and 4B, a Class 1 user initiates a new contract in block 400 and inputs proposed contract terms and comments in block 402. When the Class 1 user initiates a contract, the contract negotiator system automatically assigns team members according to the Class 1 user's permanent hierarchy. The permanent hierarchy comprises users from each class, except Class 6, who are immediately and permanently responsible for that particular contract, and represents part of a contract team.

A new contract version is initiated if, after submission by a Class 1 user, any non-comment changes are made to the contract components and the contract is approved. When a new version is generated, the status of the previous version is automatically set to "Void." A "Canceled"

Detailed Description Text (49):

Detailed Description Text (54):

Detailed Description Text (91):

Detailed Description Text (106):

Detailed Description Paragraph Table (9):

CLAIMS :

- a client applet that provides access to said contract database for said plurality of users;

a first server coupled to said client applet; and

a second server coupled to said contract database and said first server that updates said contract database with modifications to said contract component data received from said client applet through said first server.

48. A method of creating a contract type within a contract negotiator system comprising multiple users coupled to a network, the method comprising the steps of:

providing a first generalized template and a second generalized template that define database storage in a contract database;

defining at least one contract component of said new contract including said first generalized template;

defining a contract tree including said at least one contract component;

storing display data in said first generalized template;

displaying said displaying data in an applet;

receiving response data in said applet; and

storing said response data in said second generalized template to create said contract within said contract negotiator system.

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Generate Collection



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L15: Entry 6 of 8

File: PGPB

Nov 28, 2002

DOCUMENT-IDENTIFIER: US 20020178077 A1

TITLE: Method for automatically invoking a software module in response to an internal or external event affecting the procurement of an item

Summary of Invention Paragraph:

[0008] With the growth of the Internet and the resulting changes in the speed and access of information, it has been determined that companies would greatly benefit from solutions that provide continuous access to the many types of information that are now available and can intelligently incorporate this information into their SCM processes. If such access were provided (as in accordance with the present invention), companies would be able to analyze both enterprise data and market data for risks and opportunities, make strategic decisions based on those risks and opportunities, and be able to automate their operations around this critical information. It thus would be highly advantageous for companies to be able to integrate these solutions into their SCM processes.

Summary of Invention Paragraph:

[0016] Another object of the present invention to provide a system and methods for recommendation functions of VCI systems, including inventory management, contract negotiations, purchasing recommendations, data optimization, supplier allocation, demand aggregation, spot market analysis, and market and news alerts in accordance with the present invention.

Detail Description Paragraph:

[0036] FIG. 1A illustrates an exemplary embodiment of a conventional private marketplace. As illustrated in FIG. 1A, private marketplace 2 links a plurality of suppliers 4-10 with single buyer 12, providing a one-to-many commerce hub. Private marketplaces 2, like an on-line exchange, tend to focus on improving existing trading relationships and building better integration of channel partners. For example, a large enterprise, such as Dell Computer, may develop a private marketplace for a select group of its suppliers, so that it can purchase and source materials on a needs basis. An enterprise may use private marketplaces to provide access to internal enterprise data and automate the purchasing process with select suppliers, but private marketplaces are often limited to a specific enterprise, do not provide access to broader market data, and are difficult if not costly to develop, maintain, and update.

Detail Description Paragraph:

[0039] FIG. 1C illustrates an exemplary embodiment of a Value Chain Intelligence (VCI) system in accordance with the present invention. VCI system 28 is an enterprise system that preferably collects, analyzes and integrates data from a plurality of data sources internal to an enterprise with data from a plurality of data sources external to an enterprise, enabling users to leverage market and supply chain conditions to make better decisions about sourcing and procurement. As illustrated in FIG. 1C, VCI system 28 links one or a plurality of data sources, such as ERP system 3 and MRP system 5, inside the enterprise (as illustrated by dimension 9). VCI system 28 also preferably links one or a plurality of additional data sources, such as component or product design and engineering source 7, inside the business unit and involved in designing and modifying the design of products or systems for the enterprise, which typically includes specifying components and the like, and generally may be considered a different domain within the enterprise as compared to ERP system 3 and MRP system 5, etc. (as illustrated by dimension 11). Data sources within dimensions 9 and 11 are preferably internal to the enterprise. In addition to these sources, VCI system 28 links a plurality of data sources outside the enterprise, including, for example, industry news 15, industry analysts 17, spot markets 19, net markets 21, vendor catalogs 23, potential suppliers 25, tier 1 manufacturers to

tier N manufacturers, and distributors 31 (as illustrated by dimension 13). Data sources within dimension 13 are preferably external to the enterprise. For example, a large enterprise, such as Motorola, may connect its proprietary data to VCI system 28, which provides access to data from manufacturers, distributors, suppliers, vendors, exchanges, and news services, and vice versa. Accordingly, the large enterprise is provided tools in a desirable manner in order to be able to negotiate not only the purchase but also the sale of direct materials based on current contract, spot market prices, and up-to-date needs and requirements. Thus, unlike private exchanges, VCI system 28 can provide access to external data outside a customer's enterprise, and unlike public exchanges it can provide access to a greater range of external data critical to making strategic decisions about market and supply chain conditions. In accordance with the present invention, VCI system 28 obtains and discovers a wide variety of internal and external data for particular components or other items, with the data typically originating in widely disparate forms and formats, with the data transformed and stored in a manner so as to be flexibly queried (such as by part number, type or characteristic such as by manufacturer, memory density, speed, functional characteristics, and the like) and continuously updated, thereby enabling a more optimum strategic decision-making process.

Detail Description Paragraph:

[0042] FIG. 3A illustrates examples of internal data sources and respective types of internal data in accordance with the present invention. Internal data 30 preferably are comprised of proprietary data aimed at and/or operated by an enterprise from a plurality of internal data sources, including but not limited to suppliers' databases 42, contracts' databases 44, product quality databases 46, internal parts databases 48, data marts 50, ERP systems 52, SCM systems 54, MRP systems 56, and Customer Relations Management (CRM) systems 58. (Proprietary data generally are privately owned data that may require a special arrangement, such as a contract, partnership, etc., with the enterprise or data provider in order to use or purchase access to the data.) Since internal data 30 originate from a plurality of sources, internal data 30 are extracted in a variety of formats and therefore require transformation (which will be described further below). Internal data from suppliers' databases 42 preferably include proprietary information about suppliers, such as product catalog data, product specifications, part numbers, prices, quantity, total net landed cost, delivery dates, lead time, PO histories, manufacturer information, manufacturers of equivalent parts, supplier information, suppliers of equivalent parts, current sales offers, past sales offers, availability, class of equivalent parts, class of upgrade parts, standard industry categories, classes of parts that are equivalent to said component for certain specified applications, client inventories, distributor data, retailer data, transportation schedules, distribution schedules, warehouse locations, supply inventories, supply forecasts, inventory targets, contract terms, contract prices, sales targets, fill rates, just-in-time (JIT) reports, supplier ratings, Vendor Managed Inventory (VMI) data, market data, industry data, product reviews, product launch information, supplier locations, and/or shipping locations, etc.

Detail Description Paragraph:

[0043] In accordance with the present invention, internal data from contracts databases 44 preferably include proprietary information about client contracts, such as product specifications, part numbers, prices, custom pricing, total net landed cost, delivery schedules, allocation terms, manufacturer information, contract terms, contract amendments, contract availability, company policies, and/or target for 1000's of units to meet, etc. Internal data from product quality databases 46 preferably include proprietary information about the quality of specific products and manufacturers, such as product specifications, part numbers, prices, total cost, quality metrics, internal reports, product change requests, warranty information, manufacturer information, manufacturer of equivalent parts, measurement standards, supplier information, suppliers of equivalent parts, availability, class of equivalent parts, class of upgrade parts, class of downgrade parts, standard industry categories, classes of parts that are equivalent to said component for certain specified applications, client inventories, and/or product reviews, etc. Internal data from internal parts databases 48 preferably include proprietary information about parts, such as parts catalogs, part numbers, product specifications, prices, total net landed cost, availability, manufacturer information, manufacturers of equivalent parts, supplier information, suppliers of equivalent parts, class of equivalent parts, class of upgrade parts, class of downgrade parts, classes of parts that are equivalent to said component for certain specified applications, spare parts

inventories, supply inventories, supply forecasts, inventory targets, fill rates, just-in-time (JIT) reports, Vendor Managed Inventory (VMI) data, product reviews, supplier ratings, manufacturer ratings, and/or contract terms, etc. Internal data from data marts 50 preferably include a plurality of proprietary information, such as product specifications, manufacturer information, manufacturers of equivalent components, supplier information, suppliers of equivalent components, upgrades of components, downgrades of components, prices, current sales offers, past sales offers, availability, total net landed cost, EOL information, part numbers, part catalogs, class of equivalent parts, class of upgrade parts, class of downgrade parts, standard industry categories, classes of parts that are equivalent to said component for certain specified applications, news reports, market reports, industry bulletins, daily news broadcasts, emergency broadcasts, trade journals, product reviews, supplier ratings, product launch information, delivery dates, supplier locations, shipping locations, weather reports, historical weather data, geographical reports, transportation reports, traffic reports, contract prices, sales targets, fill rates, JIT reports, company policies, manufacturer directories, retailer directories, client account information, spare parts inventories, supply inventories, supply forecasts, inventory targets, fill rates, JIT reports, VMI data, product reviews, supplier ratings, manufacturer ratings, contract terms, contract adjustments, and/or customized data based on the integration of first information and second information, etc.

Detail Description Paragraph:

[0044] In further reference to FIG. 3A, in accordance with the present invention, internal data from ERP systems 52 preferably include proprietary information about internal operations, such as costs, assets, capital equipment data, PO's, demand forecasts, ownership status, purchasing records, stockroom inventories, order processing data, ledgers, product information, manufacturer information, distributor information, retailer information, supply inventories, supply forecast, inventory targets, contract terms, contract prices, sales targets, fill rates, JIT reports, part numbers, supplier ratings, VMI data, stockroom inventories, and/or ERP planning data, etc. Internal data from SCM systems 54 preferably include proprietary information about supply chain operations, such as on-hand inventories, order processing, event management, costs, assets, data about transport networks, VMI data, key performance indicators, material flows, inventory control reports, new product launches, new customer segments, facility locations, warehouse locations, suppliers, manufacturers, distributors, forecasts, promotions, product specifications, product life cycles, product obsolescence, product profiles, revenues, sales objectives, supplier selection criteria, sourcing, ordering, invoicing, delivery schedules, bid prices, ask prices, service levels, production schedules, material and constraints capacity, BOMs, manufacturing data, collaboration data, inventory levels, allocation and planning data, confirmation dates, product allocation data, product demand data, due dates, carriers, tariffs, transportation data, shipping routes, handling capacities, shipping schedules, prices, equipment status, delivery logs, event tracking data, weather, purchase history, current units in inventory, inventory logs, current days of supply, demand forecasts, inventory targets, percent deviation from target, location breakdowns, ownership status, and/or SCM planning data, etc. Internal data from MRP systems 56 preferably include proprietary information about internal resource planning, such as PO's, work orders, BOMs, routing and resource data, project structures, asset structures, claims management data, order changes, engineering changes, production schedules, production orders, product and asset life cycles, costs, margins, revenues, status reports, project plans, product specifications, parts, maintenance schedules, product performance data, upgrade data, refurbishment data, backlog data, hazardous materials management information, MSDS datasheets, product safety information, and/or MRP planning data, etc. Internal data from Customer Relationship Management (CRM) systems 58 preferably include proprietary information about customer relations, such as profits, billing, contracts, sales activity data, contact management data, customer segmentation data, product and services profiles, marketing plans, POs, order tracking data, order acquisition data, customer address directories, customer preferences, customer site information, vital customer data, customer service management data, field service data, order life cycle process, and/or CRM planning data, etc. It should be noted that in accordance with the present invention, internal data 30 are not limited to these types and sources of proprietary information, but may also include alternate types and sources of information internal to a customer's enterprise.

Detail Description Paragraph:

[0059] In accordance with preferred embodiments of the present invention, analysis services 78 performs quantitative and qualitative analysis on the data results of discovery services 76 via a plurality of algorithms. Analysis services 78 may be customized based on user-defined criteria. For instance, a client may request risk analysis, involving applications associated with analysis services 78 to provide a plurality of analyses, such as model and forecast revenues based on inventory levels, demand forecasts, market pricing, availability of constituent parts, etc. Such analyses are functions of modules in VCI system 28 (which is described in more detail below); the modules implement a plurality of data and analysis tools, which offer solutions to domain-specific problems. Analysis services 78 thus examine and analyze a plurality of discovered data, such as contract terms, performance metrics, current inventories, surplus and shortages, warehouse locations, etc., and produce one or a plurality of reports based on the subsequently analyzed data. In accordance with preferred embodiments, the resulting data of analysis services 78 are then preferably reintegrated back into data mart 74.

Detail Description Paragraph:

[0071] Changing information in an internal application. For example, a user may change the part number of a specified component in a Bill of Materials (BOM) after being alerted that the component is being discontinued.

Detail Description Paragraph:

[0162] Accordingly, alerts preferably reduce the latency period in decision-making by informing users of key events, such as component shortages, price shifts, supplier problems, and schedule changes in order to allow synchronization of component procurement and operations and inventory cost reduction. For example, when a production schedule changes for a particular model of a product, the change shows up as an alert to the user of VCI system 28. The user may choose to be notified of the model and with it the BOM for that particular model. Once the alert is triggered, a module, such as the component shortage module, flags the components for the model, and either refers to alternate suppliers or refers to alternate equivalent components. Users may also look at procurement lead-time for that model to determine whether the schedule change can be resolved by procuring from the same supplier, and/or procuring from a different supplier, and/or procuring an alternate component.

Detail Description Paragraph:

[0180] Supplier allocation module: This module preferably identifies and calculates the percentage of a business that should be allocated to each supplier. The supply allocation module provides the user with internal supplier ratings on quality, delivery, price, service, technology, etc., allowing the user to skew the ratings data as necessary. This module enables the user to identify the appropriate allocation to each supplier for each part depending on one or a prioritized combination of the aforementioned criteria. For example, a procurement organization will often need to allocate the purchase quantity across a set of suppliers. The supplier allocation module determines the optimal allocation of parts ordered across a set of suppliers based on criteria specified by buyers. Such criteria, for instance, may include: meeting contractual agreements; awarding the largest allocation to the supplier with the best performance rating; awarding a supplier based on quality performance or strategic technological importance; minimizing delivery risks; minimizing costs; etc. Moreover, different departments, such as a finance department, may also implement the supplier allocation module to determine the allocation of parts to maximize gross margin and/or revenues. Accordingly, this module addresses a plurality of constraints that affect the results of production schedules, desired inventory levels, contractual agreement or pre-set allocation, supplier's availability and costs, etc. In deriving an optimal solution, supplier allocation module uses data retrieved from enterprise databases (such as MRP systems 56), vendor databases, or marketplace databases to determine supplier ratings. In an alternate preferred embodiment, this module also accesses data entered by users or estimated by the application itself. For example, an overall performance rating may be determined by calculating a total score based on the weights of a plurality of performance ratings, such as technology, quality, delivery, cost, etc. Thus, ratings can be used to determine allocation quantities for each supplier, depending on any combination and ordering of the aforementioned criteria.

Detail Description Paragraph:

[0183] Component risk mitigation module: This module preferably identifies the critical components, calculates the cost of expediting or holding them in excess inventory, and determines the financial impact of various magnitudes of production change. The component risk mitigation module provides a means of mitigating when a supplier's inability to meet delivery commitments or unexpected changes in production volume (increase or decrease) lead to component shortage or excess.

Detail Description Paragraph:

[0187] FIG. 6 is a high-level diagram illustrating preferred embodiments of the hardware and software components of VCI system 28. VCI system 28 preferably consists of four functional component blocks: internal data collection components 114, external data collection components 116, data integration components 118, and data application components 120. As illustrated in FIG. 6, internal data collection components 114 of VCI system 28 preferably consist of an internal data sources 122-126, extract modules 128-136, transform modules 138-146, and connectors 148-150. Internal data collection components 114 preferably are implemented at the customer's site, and extract and transform internal data 30 from a plurality of internal data sources, such as contract databases 46, ERP systems 54, SCM systems 56, etc. (as illustrated in FIG. 3A). Internal data collection components 114 are preferably implemented at the client's site and accordingly are coupled to a network, such as WAN, LAN, Internet, etc. In accordance with the present invention, the Internet connection may consist of a dial-up connection, private line, VPN, DSL, ISDN, T-1, etc.

Detail Description Paragraph:

[0191] As further illustrated in FIG. 6, data integration components 118 consist of load module 188, database API 189, ETL metadata database 190, discovery database 192, analysis database 194, purge/archive module 196, OLAP server 198, and OLAP analysis cubes 1-N 200. Data integration components 118 provide the functionality of a load module and integrated data mart, whereby normalized data is loaded from a plurality of sources at different times and in different formats, and organized so that it is suitable for complex querying and analysis. Internal data 30 and external data 32 are placed in data integration components 118 in order to build applications for an integrated repository, such as a data mart. Load module 188 manages the process of loading, updating, and rebuilding discovery database 192 and analysis database 194. Both discovery database 192 and analysis database 194 are types of relational databases. The loading process triggers events in the OLAP server 198 that rebuilds OLAP analysis cubes 1-N 200. (OLAP refers to On-line Analytic Processing, which one of skill in the art will appreciate is a form of a multi-dimensional database.) OLAP server 198 conducts multi-dimensional queries and pivot table services through the use of OLAP analysis cubes 1-N 200, which preferably perform data aggregation on top of analysis database 194. Purge/archive module 196 manages the databases, so that data may be archived and purged as necessary. ETL metadata database 190 is an operational RDBMS that stores adapter and other information that is used and required by load module 188.

Detail Description Paragraph:

[0198] In accordance with the present invention, customer custom database 122 contains a predetermined subset of internal data 30 from one source or a plurality of sources, such as suppliers' databases 42, contract databases 44, product quality databases 46, ERP system 52, etc. (as illustrated in FIG. 3A). It should be noted that in accordance with the present invention that customer custom database 122 represents generically any customer custom database, each of which is suitable for supplier data, contract data, product quality data, etc. Accordingly, the process of calling for internal data 30 is preferably initiated by load module 188, custom extract module 128, or custom customer database 122. For example, load module 188 may initiate a request to call a subset of internal data 30 from customer custom database 122 by transmitting a command to generate a request from custom extract module 128 via a network connection. Custom extract module 128 then sends the request to extract internal data 30 from customer custom database 122, which preferably responds to the request by sending a message containing the requested internal data to custom transform module 138. Custom transform module 138 aggregates internal data 30 and performs calculations on it to normalize the data into a format compatible with the schema in discovery database 192 and analysis database 194 in data integration components 118. Since internal data 30 may come from a plurality of sources, internal data 30 must be normalized to conform to the specific database schema in discovery



database 192 and analysis database 194. Once internal data 30 is normalized by custom transform module 138, then the data-set is transmitted via load module 188 to discovery database 192 and analysis database 194. It is important to note that internal data 30 may be extracted simultaneously from a plurality of database sources and not just from a single customer custom database.

Detail Description Paragraph:

[0201] As further illustrated in FIG. 7A, in accordance with the present invention, customer Oracle ERP 126 contains a subset of internal data 30, such as data from ERP system 52 (as illustrated in FIG. 3A). Accordingly, the process of calling for internal data 30 is again preferably initiated by load module 188, Oracle ERP extract module-1 134, or customer Oracle ERP 126. For example, Oracle ERP extract module-1 134 may initiate the process by sending a request for a subset of internal data 30 to customer Oracle ERP 126. In order for Oracle ERP extract module-1 134 to request and receive internal data 30 in a compatible format from customer Oracle ERP 126, Oracle ERP extract module-1 134 must extract data via PL/SQL calls from Oracle advanced queue tables 150, which maintain the messaging and queuing system for access and data extraction from Oracle ERP 126. Thus, Oracle ERP extract module-1 134 makes requests via PL/SQL calls to Oracle advanced queue tables 150 to extract specified internal data 30 from customer Oracle ERP 126. Oracle advanced queue tables 150 processes PL/SQL calls, then pulls internal data 30 from Oracle ERP 126. Oracle ERP extract module-1 134 then retrieves updated internal data 30 in XML format from Oracle advanced queue tables 150. Oracle ERP extract module-1 134 then sends internal data 30 formatted as XML documents to transform module-1 144, which preferably aggregates and normalizes the XML-formatted data, so that extracted internal data 30 conforms to the specific schema in discovery database 192 and analysis database 194. Once the XML documents containing internal data 30 are normalized by transform module-1 144, they are sent to discovery database 192 and analysis database 194 via load module 188.

Detail Description Paragraph:

[0203] It should be noted that requests for internal data 30 may be initiated independently and simultaneously from a plurality of sources. For example, customer custom database 122 may begin the process of calling for a subset of internal data 30, while SAP extract module-1 130 may have already begun the process of calling for a subset of internal data 30 from customer SAP ERP 124 and load module 144 may also have already begun calling for a subset of internal data 30 from customer Oracle ERP 126. Thus, the process of requesting internal data 30 from any of the data sources that provide them, such as suppliers database 42, contracts database 44, product quality database 46, internal parts database 48, data mart 50, ERP systems 52, SCM systems 54, MRP systems 56, CRM systems 58, etc., is preferably initiated independently and/or simultaneously from a plurality of sources.

Detail Description Paragraph:

[0205] Since internal data collection components 114 have been described in conjunction with specific preferred and other embodiments, many substitutions, alternatives and variations will be apparent to those skilled in the art. For example, data sources for internal data 30 include more than ERP systems, such as SCM systems 54, MRP systems 56, CRM systems 58 etc. Accordingly, the type of business connector as well as the extract and transform modules for such data sources will change depending on the type and format of the data. In addition, for example, data sources for internal data 30 include all kinds of customer custom databases, such as suppliers' databases 42, contracts databases 44, product quality databases 46, internal parts databases 48, data marts 50, etc. Thus, the invention is intended to embrace all of the alternatives and variations that fall within the spirit and scope of the invention.

Detail Description Paragraph:

[0220] In addition, external data 32 is preferably received by transform modules 176-186 as either streaming data or in a single query/response. Therefore, external data 32 may take the form of batch updates or real-time updates, depending on the nature of the request and response.

Detail Description Paragraph:

[0226] It should be noted that data integration components 118 of VCI system 28 preferably

include only one load module 188. The location of the data is defined in standard database language, such as PL/SQL, but in order to execute the process load module 188 must call database APIs 189. Load module 188 preferably serves as a central location for controlling the loading and updating of a multitude of data in the database, and thus separates the database design from the act of loading. In other words, developers do not have to manage the data and thus be concerned with when and how to access data, but instead may simply write to the API.

Detail Description Paragraph:

[0227] In accordance with the present invention, ETL metadata database 190 is a RDBMS (Relational Database Management System) that stores a registry of adapters and other data used and required by load module 188. Metadata database 190, for example, assists in analyzing changes in database tables, tracking individual data elements, and building the data mart.

Detail Description Paragraph:

[0245] Alert procurement and other supply chain professionals of various events regarding material procurement and status in order to ensure fulfillment meets their goals. These events may involve shortages, changes in component prices, quality problems, increases in Enterprise demand and schedule changes for a component.

Detail Description Paragraph:

[0249] Viewing BOMs to see if any component should be supplied to a manufacturer that currently is not included in the part/supplier database, in addition to viewing any changes in the BOM on released models

Detail Description Paragraph:

[0292] A part specification has been updated for a part in an existing BOM, and requires a change in supplier manufacturing processes.

Detail Description Paragraph:

[0297] Send alerts to users of procurement product and/or suppliers of any component being replaced (Engineering Change Order) for a BOM on a released model

Detail Description Paragraph:

[0299] Receive an alert for a change in the production schedule

Detail Description Paragraph:

[0302] Receive an alert when a designer makes an engineering change on a component for an existing BOM

Detail Description Paragraph:

[0308] Thus, in accordance with such an exemplary embodiment of the present invention, the contract price for part 01234 and the online marketplace prices for part 01234 represent exemplary embodiments of internal data 30 and external 32, respectively. Furthermore, contract prices for part 01234 may be located in one of custom databases 122, specifically in the contracts database, and accordingly is extracted by extract module 128, transformed by transform module 138, and loaded into discovery database 192 and analysis database 194, which comprise data mart 74, via load module 188. Similarly, online marketplace prices for part 01234 are obtained by continuously accessing marketplace database 156 and Internet sources 162, extracted by extraction module 172 and 174, transformed by transform module 184 and 186, and loaded into discovery databases 192 and analysis database 194 via load module 188.

Detail Description Paragraph:

[0315] In accordance with the present invention, BOM optimization module in module layer 86 preferably helps to determine the optimal allocation of components in the face of a component shortage. Thus, if there is a shortage of a component with part number X and if part number X is used in a plurality of products 1-N, then what should the manufactured quantities be considering the criteria set by procurement, manufacturing, and/or finance. For example, such criteria may include maximizing production, maximize revenues, maximizing margins, etc. Such an analysis takes into account the production schedule, demand forecast, inventory of components, their usage in each model, etc., and calculates the manufactured quantities, depending on the

expressed aforementioned criteria. In response to an alert, an automatic invocation due to a news story, or the user's own initiative, the user preferably accesses the functionality of BOM optimization module in module layer 86 through the VCI user interface 208. Accordingly, the user specifies in the input window the part number to be considered for BOM optimal allocation. The input window, in turn, presents the data pertinent to the task of optimal BOM allocation data, such as production schedule, demand forecast, inventory of components, the models that use the part, their usage in each model, etc. It should be noted that the inventory data for the user-specified part is an example of internal data 30. The inventory data for such a part may be found, for example, in ERP system 124, extracted via business connector 148 and extract module 130 or 132, transformed by transform module 140 or 142, and loaded into discovery database 192 and analysis database 194 via load module 188. In accordance with the present invention, the specific type of business connector, extraction module, and transform module depends upon the specific data source for internal data 30, such as ERP system 52, MRP system 56, contracts databases 44, etc. The BOM optimization module in module layer 86 generally retrieves the needed data by querying data mart 74, but if certain of the required data are not available, then BOM optimization module may query the user manually input that data. Upon receiving the necessary data, the BOM optimization module preferably passes the data to analytics engine 99 for processing. Accordingly, analytics engine 99 applies a plurality of optimization tools and techniques, such as linear programming, integer programming, quadratic programming, constraint programming, etc., generally suitable for problems of discovering a solution, to the problem of maximizing or minimizing a mathematical formula given a set of constraints. Upon calculating the optimal solution, analytics engine 99 passes the solution to the BOM optimization module, which presents the solution to the user through VCI user interface 208. It should be noted that it is possible that such a solution may be transmitted or made available to the user in the form of a notification, such as e-mail, voice mail, pager message, etc. Such a notification may be particularly suitable in cases where the amount of time required for analytics engine 99 to calculate the optimal solution is significant or in cases where the user chooses to be notified in such a manner. Additionally, the user may specify that the solution discovered by analytics engine 99 be delivered, either by e-mail or some other form of notification, to a list of individuals, other than the user that initiated the request to the component BOM optimization module.

## CLAIMS:

11. The method of claim 1, wherein the internal data is selected the from one or more data sources, consisting of suppliers' databases, contracts' databases, product quality databases, internal parts databases, data marts, ERP systems, SCM systems, MRP systems, and/or CRM systems.
13. The method of claim 11, wherein the internal data from the contracts' databases consists of one or more of the following: product specifications, part numbers, prices, custom pricing, total net landed cost, delivery schedules, allocation terms, manufacturer information, contract terms, contract amendments, contract availability, company policies, and/or target number of units.
14. The method of claim 11, wherein the internal data from the product quality databases consists of one or more of the following: product specifications, part numbers, prices, total cost, quality metrics, internal reports, product change requests, warranty information, manufacturer information, manufacturer of equivalent parts, measurement standards, supplier information, suppliers of equivalent parts, availability, class of equivalent parts, class of upgrade parts, class of downgrade parts, standard industry categories, classes of parts that are equivalent to said component for certain specified applications, client inventories, and/or product reviews.
19. The method of claim 11, wherein the internal data from the MRP systems consists of one or more of the following: PO's, work orders, BOMs, routing and resource data, project structures, asset structures, claims management data, order changes, engineering changes, production schedules, production orders, product and asset life cycles, costs, margins, revenues, status reports, project plans, product specifications, parts, maintenance schedules, product performance data, upgrade data, refurbishment data, backlog data, hazardous materials

management information, MSDS datasheets, product safety information, and/or MRP planning data.

22. The method of claim 1, wherein the first information is selected from the one or more data sources, consisting of suppliers, vendors, product databases, electronic catalogs, online marketplaces, subscription sources, news sources, suppliers' databases, contracts' databases, product quality databases, internal parts databases, data marts, ERP systems, SCM systems, MRP systems, and/or CRM systems.

33. The method of claim 22, wherein the first information from the contracts' databases consists of one or more of the following: product specifications, part numbers, prices, custom pricing, total net landed cost, delivery schedules, allocation terms, manufacturer information, contract terms, contract amendments, contract availability, company policies, and/or target number of units.

34. The method of claim 22, wherein the first information from the product quality databases consists of one or more of the following: product specifications, part numbers, prices, total cost, quality metrics, internal reports, product change requests, warranty information, manufacturer information, manufacturer of equivalent parts, measurement standards, supplier information, suppliers of equivalent parts, availability, class of equivalent parts, class of upgrade parts, class of downgrade parts, standard industry categories, classes of parts that are equivalent to said component for certain specified applications, client inventories, and/or product reviews.

39. The method of claim 22, wherein the first information from the MRP systems consists of one or more of the following: PO's, work orders, BOMs, routing and resource data, project structures, asset structures, claims management data, order changes, engineering changes, production schedules, production orders, product and asset life cycles, costs, margins, revenues, status reports, project plans, product specifications, parts, maintenance schedules, product performance data, upgrade data, refurbishment data, backlog data, hazardous materials management information, MSDS datasheets, product safety information, and/or MRP planning data.

75. The method of claim 65, wherein the internal data is selected from the one or more data sources, consisting of suppliers' databases, contracts' databases, product quality databases, internal parts databases, data marts, ERP systems, SCM systems, MRP systems, and/or CRM systems.

77. The method of claim 75, wherein the internal data from the contracts' databases consists of one or more of the following: product specifications, part numbers, prices, custom pricing, total net landed cost, delivery schedules, allocation terms, manufacturer information, contract terms, contract amendments, contract availability, company policies, and/or target number of units.

78. The method of claim 75, wherein the internal data from the product quality databases consists of one or more of the following: product specifications, part numbers, prices, total cost, quality metrics, internal reports, product change requests, warranty information, manufacturer information, manufacturer of equivalent parts, measurement standards, supplier information, suppliers of equivalent parts, availability, class of equivalent parts, class of upgrade parts, class of downgrade parts, standard industry categories, classes of parts that are equivalent to said component for certain specified applications, client inventories, and/or product reviews.

83. The method of claim 75, wherein the internal data from the MRP systems consists of one or more of the following: PO's, work orders, BOMs, routing and resource data, project structures, asset structures, claims management data, order changes, engineering changes, production schedules, production orders, product and asset life cycles, costs, margins, revenues, status reports, project plans, product specifications, parts, maintenance schedules, product performance data, upgrade data, refurbishment data, backlog data, hazardous materials management information, MSDS datasheets, product safety information, and/or MRP planning data.

86. The method of claim 65, wherein the first information is selected from the one or more data

sources, consisting of suppliers, vendors, product databases, electronic catalogs, online marketplaces, subscription sources, news sources, suppliers' databases, contracts' databases, product quality databases, internal parts databases, data marts, ERP systems, SCM systems, MRP systems, and/or CRM systems.

96. The method of claim 86, wherein the first information from the contracts' databases consists of one or more of the following: product specifications, part numbers, prices, custom pricing, total net landed cost, delivery schedules, allocation terms, manufacturer information, contract terms, contract amendments, contract availability, company policies, and/or target number of units.

97. The method of claim 86, wherein the first information from the product quality databases consists of one or more of the following: product specifications, part numbers, prices, total cost, quality metrics, internal reports, product change requests, warranty information, manufacturer information, manufacturer of equivalent parts, measurement standards, supplier information, suppliers of equivalent parts, availability, class of equivalent parts, class of upgrade parts, class of downgrade parts, standard industry categories, classes of parts that are equivalent to said component for certain specified applications, client inventories, and/or product reviews.

102. The method of claim 86, wherein the first information from the MRP systems consists of one or more of the following: PO's, work orders, BOMs, routing and resource data, project structures, asset structures, claims management data, order changes, engineering changes, production schedules, production orders, product and asset life cycles, costs, margins, revenues, status reports, project plans, product specifications, parts, maintenance schedules, product performance data, upgrade data, refurbishment data, backlog data, hazardous materials management information, MSDS datasheets, product safety information, and/or MRP planning data.

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